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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/935,510	08/23/2001	Julius L. Goldstein	16918-8183	9482

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EXAMINER

PENDLETON, BRIAN T

ART UNIT	PAPER NUMBER
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2644

DATE MAILED: 04/27/2004

14

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/935,510

Applicant(s)

GOLDSTEIN, JULIUS L.

Examiner

Brian T. Pendleton

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 January 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-19, 21-32 and 34-65 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 59 is/are allowed.
- 6) ☒ Claim(s) 2, 3, 6-17, 28-32, 34, 35, 38, 39, 41, 43, 45-51, 55-58, 60-65 is/are rejected.
- 7) ☒ Claim(s) 4, 5, 18, 19, 22-27, 36, 37, 40, 42, 44 and 52-54 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

Applicant's arguments filed 1/27/04 have been fully considered but they are not persuasive. Applicant alleges that the Cummins reference does not teach instantaneous gain compression referring to figure 4 in Cummins. Examiner disagrees with such an assertion because of the following reasons: 1) No gain change is truly instantaneous. Any signal processing system encounters an inherent processing delay as the processor must compute output gain values for the inputted values. That process cannot take place instantaneously. As Applicant has described instantaneous gain compression as an input/output relationship which does not rely on previous inputs, Examiner has interpreted that feature as one in which a signal processor uses a memory to look up output gain values, does not use any averaging, but nonetheless is not totally instantaneous. 2) Cummins uses a memory to calculate gain values. As taught in the abstract and column 2 lines 44-48, the digital signal processor has a programmable memory with the desired amplification characteristics of the user. 3) The delay mentioned by Cummins in figure 4 is to align the input samples with the calculated gain values. The delay is necessary because of the inherent processing delay associated with looking up the gain values, as mentioned in point 1 above.

Applicant's arguments, see page 21, filed 1/20/04, with respect to claims 1, 2, 12, 13, 20, 21, 30, 32, 56 and 58 and reference to Armstrong et al have been fully considered and are persuasive. The rejection of the claims has been withdrawn.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2, 3, 7, 13-15, 21, 30, 34, 35, 39, 45-47, 49, 50, 55, 57, and 60-65 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cummins et al in view of Stockham, Jr. et al. Cummins et al disclose a hearing aid having a microphone 30 (transducer), a processor containing a digital signal processor 50 which does non-linear amplification and noise and signal tracking (step 67 figure 3). As shown in figure 5, the gain is linear between points K1 and K2 and compressed above the point K2, which is the compression threshold. Discussed in column 3 lines 15-18, the knee point K2 can be varied, making the compression threshold adaptive. The compression is instantaneous as it does not rely on historical values of the input signals (see explanation above). The compressive gain is less than the linear gain portion as illustrated by the slope R2 which is less than the slope R1 in figure 5. Cummins et al do not state that the amplification is done in a portion of a subband of the input sound signal. However that feature was well known and practiced in the art as evidenced by Stockham, Jr. et al. Stockham, Jr. et al teach a hearing aid having an input transducer, a plurality of bandpass filters 16 and compressive processors 18 for processing the input sound in a plurality of frequency bands. Using the bandpass filters created at least one bandpass non-linearity (BPNL) channel. It would have been obvious to one of ordinary skill in the art at the time of invention to use the teachings of Stockham, Jr. et al

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in the invention of Cummins et al since the human ear responds to different frequency bands in different fashions and each band would require different compression functions. Claims 2, 21, 34, 35, 60, 63, and 64. Also, column 9 lines 29-34 and figure 10 specify that K2 (which is continuous with respect to K1) can be varied as a function of the signal and noise estimates. Thus, independent claim 55 and dependent claims 3, 57, 61 and 62 are met. As to claims 7 and 39, there exists a sharp transition between the linear gain section and the compressive gain section. As to claims 13 and 30, Stockham Jr. et al teach a plurality of channels. Cummins et al, being modified according to the teachings of Stockham Jr. et al, would have an unique compression threshold in each channel and the knee point K2, would be adjusted according to signal and noise level estimates in each channel, thereby meeting claims 14, 15 and 45. Regarding claims 46, 47, 49 and 50, the processor 50 is a digital signal processor. Cummins does not teach that the signal processing is in analog. Examiner takes Official Notice that in the art of signal processing, digital and analog methods were well known and easily implemented. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use analog signals in the invention of Cummins et al and Stockham Jr. et al, meeting claim 65.

Claims 6, 31, 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cummins et al in view of Stockham Jr. et al as applied to claims 3, 21 and 35 above in further view of Frindle et al. Cummins et al and Stockham Jr. et al disclose a hearing aid having a microphone 30 (transducer), a processor containing a digital signal processor 50 which does non-linear amplification and noise and signal tracking in a

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plurality of frequency bands, whereby the amplification has a compressed gain region above knee point K2 which is varied according to signal and noise level estimates. The combination does not teach that the transition between the linear and compressed gain regions is smooth. In figure 3, Frindle et al disclose an compressor amplifier with a soft knee that provides a smooth transition between the linear region A and compressed region B. In column 2 lines 27-37, it was taught that the smooth transition reduces audible distortion, therefore one of ordinary skill in the art would have been motivated to provide that feature in any compressor. Thus, it would have been obvious to one of ordinary skill in the art at the time of invention to use the teachings of Frindle et al and provide a smooth transition knee point in the invention described by Cummins et al and Stockham, Jr. et al.

Claims 8, 9, 11, 12, 16, 28, 32, 41, 48, 51, 56 and 58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cummins et al in view of Stockham Jr. et al, as applied to claims 3, 14, 21 and 35 above, in further view of Armstrong et al. As stated above, the combination of Cummins et al and Stockham, Jr. discloses a hearing aid having a microphone 30 (transducer), a processor containing a digital signal processor 50 which does non-linear amplification and noise and signal tracking in a plurality of frequency bands, whereby the amplification has a linear region between points K1 and K2 and a compressed gain region above knee point K2, which is varied according to signal and noise level estimates. Cummins and Stockham Jr. do not explicitly show a decompression threshold higher than the compression threshold whereby the gain is constant and less than the compressive gain. However that feature

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was standard for hearing aid compression amplifiers, as evidenced by Armstrong et al. In figures 3A and 3B, it is shown that above a decompression threshold 44 (which is higher than compression threshold 38), the gain is constant and less than the compressive gain. According to Armstrong et al, that compression transfer function was conventional in the art. It was beneficial to use such a configuration for the amplifier so that loud sound signals would not be amplified to the point of pain for the hearing aid user. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to incorporate a decompressive gain function in the combination, meeting claims 8, 16, 28 and 41. As to claim 9, the knee point K2 is adjusted around the predetermined level. Regarding claim 11, Armstrong et al show square root compression in block 84. Per claim 12, the manipulation of the variable resistors change the compression threshold values of the respective compressors (see column 3 lines 3-8) in Armstrong et al. It would have been obvious to implement that feature in the combination. In figures 3A and 3B, it is shown that above a decompression threshold 44 (which is higher than compression threshold 38), the gain is constant and less than the compressive gain. According to Armstrong et al, that compression transfer function was conventional in the art. It was beneficial to use such a configuration for the amplifier so that loud sound signals would not be amplified to the point of pain for the hearing aid user. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to incorporate a decompressive gain function in the hearing aid of Cummins et al. As to claim 17, the knee points K2 are adjusted around their predetermined levels. As to claim 32, the transition in Armstrong

et al between the linear range and compressive gain is sharp. Per claims 48 and 51, it was obvious at the time of invention to use either analog or digital signal processing techniques. As to claims 56 and 58, the variable resistors of Armstrong et al are used by the user to change the threshold between at least two values.

Claims 10, 29, 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cummins et al in view of Stockham Jr. et al in further view of Armstrong et al as applied to claims 8, 28 and 41 above, and further in view of Yanick, Jr. The combination of Cummins et al, Stockham Jr. et al and Armstrong et al disclose a hearing aid apparatus having a plurality of frequency bands, each band having a non-linear amplifier with a linear gain region, a compression threshold at the end of the linear gain region, a compressive gain region and a decompressive gain region following the compressive gain region starting at a decompression threshold. The combination does not teach an attenuation threshold above the decompression threshold as required by claim 10. Yanick, Jr. teach a non-linear hearing aid amplifier having an attenuation threshold about 90 db as illustrated in figures 2A-2B and in tables I, II and III. The advantage of the attenuation threshold was that extremely loud sounds which would be damaging to an user's ears are attenuated. Therefore one of ordinary skill in the art would have been motivated to provide such a beneficial feature in the combination of Cummins et al, Stockham Jr. et al and Armstrong et al which also has a non-linear amplifier.

Allowable Subject Matter

Claim 59 is allowed.

Claims 4, 5, 18, 19, 22-27, 36, 37, 40, 42, 44, 52-54 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian T. Pendleton whose telephone number is (703) 305-9509. The examiner can normally be reached on M-F 7-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Forester W. Isen can be reached on (703) 305-4386. The fax phone

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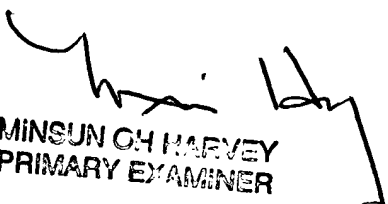
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number for the organization where this application or proceeding is assigned is (703) 872-9314.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4700.



Brian Tyrone Pendleton
April 19, 2004



MINSUN OH HARVEY
PRIMARY EXAMINER